

What is claimed is:

1           1. An image retrieval device for retrieving an image being  
2 similar to an inquired image from images stored in an image  
3 database comprising:

4           a first coefficient transforming means for transforming a  
5 first group of image feature descriptors extracted from image data  
6 accumulated in said image database and then generating a second  
7 group of image feature descriptors to be used for calculating  
8 similarity;

9           a second coefficient transforming means for transforming  
10 a first group of image feature descriptors extracted from image  
11 data of said inquired image and then generating a second group  
12 of image feature descriptors to be used for calculating  
13 similarity; and

14           a similarity calculating means for calculating similarity  
15 by comparing said second group of image feature descriptors for  
16 each piece of image data generated by said first coefficient  
17 transforming means with said second group of image feature  
18 descriptors transformed by said second coefficient transforming  
19 means.

1           2. The image retrieval device according to Claim 1, further  
2 comprising an image feature descriptor storing means and wherein  
3 said similarity calculating means compares said second group of  
4 image feature descriptors of image data of said inquired image  
5 received from said second coefficient transforming means with  
6 said second group of image feature descriptors of image data

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7 contained in said image database read from said image feature  
8 descriptor storing means.

1 3. The image retrieval device according to Claim 1, wherein  
2 said first coefficient transforming means and said second  
3 coefficient transforming means perform transform of image feature  
4 descriptors in a manner that visual similarity between images to  
5 be compared is approximated by a distance between an image  
6 expressed by said second group of image feature descriptors of  
7 image data contained in said image database and an image expressed  
8 by said second group of image feature descriptors of image data  
9 of said inquired image.

1 4. The image retrieval device according to Claim 1, wherein  
2 said first coefficient transforming means and said second  
3 coefficient transforming means use, as said image feature  
4 descriptor, a transform coefficient obtained by performing  
5 specified transforming processing of coefficient on image data.

1 <sup>536</sup><sub>017</sub> 5. The image retrieval device according to Claim 4, wherein  
2 said first coefficient transforming means and said second  
3 coefficient transforming means perform a transform of coefficient  
4 using a transform table selected depending on a kind of transform  
5 coefficient to be used as said image feature descriptor and  
6 wherein said first coefficient transforming means and said second  
7 coefficient transforming means perform retrieval of a  
8 similar-image on a trial basis using a plurality of said transform  
9 tables each having a differently segmented range of said transform

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10 coefficient and select a transform table which has showed a high  
11 rate of correctly solved retrieval in said retrieval on said trial  
12 basis.

1 6. The image retrieval device according to Claim 4, wherein  
2 said first coefficient transforming means and said second  
3 coefficient transforming means perform transform of said  
4 coefficient in a manner that fine quantization is carried out on  
5 a range of a portion of each of said transform coefficients having  
6 a small amplitude and that coarse quantization is carried out on  
7 a range of a portion of each of said transform coefficients having  
8 a large amplitude.

1 7. The image retrieval device according to Claim 4, wherein  
2 said first coefficient transforming means and said second  
3 coefficient transforming means perform a transform of said  
4 coefficient in a manner that fine quantization is carried out on  
5 said coefficient having a small power and coarse quantization is  
6 carried out on said coefficient having a large power.

1 8. The image retrieval device according to Claim 6, wherein  
2 said first coefficient transforming means and said second  
3 coefficient transforming means perform a transform of said  
4 coefficient in a manner that fine quantization is carried out on  
5 said coefficient having a small power and coarse quantization is  
6 carried out on said coefficient having a large power.

1 9. An image retrieval device for retrieving an image being

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2 similar to an inquired image from images stored in an image  
3 database comprising:

4 a coefficient transforming means for transforming a first  
5 group of image feature descriptors extracted from image data  
6 accumulated in said image database and from image data of said  
7 inquired image and then generating a second group of image feature  
8 descriptors used to calculate similarity; and

9 a similarity calculating means for comparing said second  
10 groups of image feature descriptors generated by said coefficient  
11 transforming means and then calculating similarity between an  
12 image accumulated in said image database and said inquired image.

1 10. An image retrieving method for retrieving an image being  
2 similar to an inquired image from images stored in an image  
3 database, said method comprising:

4 a step of transforming a first group of image feature  
5 descriptors extracted from image data accumulated in said image  
6 database and then generating a second group of image feature  
7 descriptors to be used for calculating similarity;

8 a step of transforming a first group of image feature  
9 descriptors extracted from image data of said inquired image and  
10 then generating a second group of image feature descriptors to  
11 be used for calculating similarity; and

12 a step of comparing said second group of image feature  
13 descriptors of image data accumulated in said image database with  
14 said second group of image feature descriptors of image data of  
15 said inquired image to calculate similarity.

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1 <sup>500</sup> 11. The image retrieval method according to Claim 10,  
 2 wherein, in said two steps in which said first group of image  
 3 feature descriptors is transformed and said second group of image  
 4 feature descriptors is generated, a transform of said coefficient  
 5 is performed using a transform table selected depending on a kind  
 6 of transform coefficient to be used as said image feature  
 7 descriptor and wherein retrieval of a similar-image is performed  
 8 on a trial basis using a plurality of said transform tables each  
 9 having a differently segmented range of said transform  
 10 coefficient and a transform table is selected which has showed  
 11 a high rate of correctly solved retrieval in said retrieval on  
 12 a trial basis.

1 12. The image retrieval device according to Claim 1, further  
 2 comprising an image size resizing means for resizing image  
 3 accumulated in said image database and/or inquired image in size,  
 4 and an image feature descriptor producing means for performing  
 5 an orthogonal transform on an image obtained by said image size  
 6 resizing means and producing an orthogonal transform coefficient  
 7 and using said orthogonal transform coefficient as a first group  
 8 of image feature descriptors.

1 <sup>500</sup> 13. The image retrieval device according to Claim 12,  
 2 wherein said image size resizing means is composed of a block  
 3 dividing means for partitioning said image data into blocks, a  
 4 dominant color calculating means for calculating a dominant color  
 5 of each of blocks obtained by said block dividing means and an  
 6 image creating means for creating an image using said dominant  
 7 color of each of said blocks as a pixel.

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1 14. The image retrieval device according to Claim 13,  
2 wherein said image creating means extracts a color average of  
3 entire pixels contained in each of said blocks as said calculated  
4 dominant color of each of said blocks.

1 15. The image retrieval device according to Claim 13,  
2 wherein said block dividing means partitions said image into 64  
3 blocks.

1 16. The image retrieval device according to Claim 12,  
2 wherein said image feature descriptor producing means performs  
3 a discrete cosine transform (DCT) on an image obtained by said  
4 image size transforming means and extracts an obtained DCT  
5 coefficient and uses said DCT coefficient as a first group of image  
6 feature descriptors.

1 17. The image retrieval device according to Claim 9, further  
2 comprising an image size resizing means for resizing image  
3 accumulated in said image database and/or inquired image in size,  
4 and an image feature descriptor producing means for performing  
5 an orthogonal transform on an image obtained by said image size  
6 resizing means and producing an orthogonal transform coefficient  
7 and using said orthogonal transform coefficient as a first group  
8 of image feature descriptors.

1 18. The image retrieval device according to Claim 17,  
2 wherein said image size resizing means is composed of a block  
3 dividing means for partitioning said image data into blocks, a

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4 dominant color calculating means for calculating a dominant color  
5 of each of blocks obtained by said block dividing means and an  
6 image creating means for creating an image using said dominant  
7 color of each of said blocks as a pixel.

1 19. The image retrieval device according to Claim 18,  
2 wherein said image creating means extracts a color average of  
3 entire pixels contained in each of said blocks as said calculated  
4 dominant color of each of said blocks.

1 20. The image retrieval device according to Claim 18,  
2 wherein said block dividing means partitions said image into 64  
3 blocks.

1 21. The image retrieval device according to Claim 9, wherein  
2 said image feature descriptor producing means performs a discrete  
3 cosine transform (DCT) on an image obtained by said image size  
4 transforming means and extracts an obtained DCT coefficient and  
5 uses said DCT coefficient as a first group of image feature  
6 descriptors.

1 22. The image retrieval method according to Claim 10,  
2 further comprising an image size resizing process of resizing  
3 image accumulated in said image database data and/or inquired  
4 image in size, and an image feature descriptor producing process  
5 of performing an orthogonal transform on an image obtained by said  
6 image size process and producing an orthogonal transform  
7 coefficient and using said orthogonal transform coefficient as

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8 a first group of image feature descriptors.

1 *Sub* 23. The image retrieval method according to Claim 22,  
2 *air* wherein said image size resizing process is composed of a block  
3 dividing process of partitioning said image data into blocks, a  
4 dominant color calculating process of calculating a dominant  
5 color of each of blocks obtained by said block dividing process  
6 and an image creating process of creating an image using said  
7 dominant color of each of said blocks as a pixel.

1 24. The image retrieval method according to Claim 23,  
2 wherein said image creating process is to extract a color average  
3 of entire pixels contained in each of said blocks as said  
4 calculated dominant color of each of said blocks.

1 25. The image retrieval method according to Claim 23,  
2 wherein said block dividing process is to partition said image  
3 data into 64 blocks.

1 26. The image retrieval method according to Claim 22,  
2 wherein said image feature descriptor producing process is to  
3 perform a DCT on an image obtained by said image size resizing  
4 process and to extract an obtained DCT coefficient and to use said  
5 DCT coefficient as a first group of image feature descriptors.

1 27. A storage medium storing a similar-image retrieval  
2 program to cause a computer to carry out retrieval of an image  
3 being similar to an inquired image from images stored in an image

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4 database, wherein said similar-image retrieval program includes  
5 a step of transforming a first group of image feature descriptors  
6 extracted from image data accumulated in said image database and  
7 then generating a second group of image feature descriptors to  
8 be used for calculating similarity, a step of transforming a first  
9 group of image feature descriptors extracted from image data of  
10 said inquired image and then generating a second group of image  
11 feature descriptors to be used for calculating similarity; and  
12 a step of comparing said second group of image feature descriptors  
13 of image data accumulated in said image database with said second  
14 group of image feature descriptors of image data of said inquired  
15 image to calculate similarity.

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